PROCEEDINGS

OF THE

CALIFORNIA ACADEMY OF SCIENCES

FOURTH SERIES

Vol. XXXI, No. 23, pp. 613–630, 12 figs. January 15, 1965

On *Amphisbaena heathi* Schmidt and *A. carvalhoi*, new species, small forms from the northeast of Brazil (Amphisbaenia: Reptilia)[1]

by

Carl Gans

Department of Biology
State University of New York at Buffalo
Buffalo, New York 14214

Review of the materials of South American amphisbaenids has repeatedly emphasized the scattered nature of our knowledge of these animals. The available samples scarcely permit the beginning of zoogeographical study; not even the ranges of many species can thus far be plotted with any degree of certainty.

Contributing to this is what may be an interesting tendency of certain groups to speciate on even relatively small mountain ranges. Examples are *Amphisbaena muñoai* Klappenbach (1961) restricted to a series of relatively low mountains scattered through the lowlands of eastern Uruguay, and *Amphisbaena vanzolinii* Gans (1963b) thus far known from only a single isolated plateau in southern British Guiana. These two species belong with *Amphisbaena mitchelli* Proctor and *A. slevini* Schmidt (Gans, 1963a) among the smallest South American amphisbaenids. It is thus not surprising to find that the Serra do Acahy in the State of Pernambuco appears to be inhabited by yet a third of these small montane forms. This species

1. Notes on amphisbaenids 16.

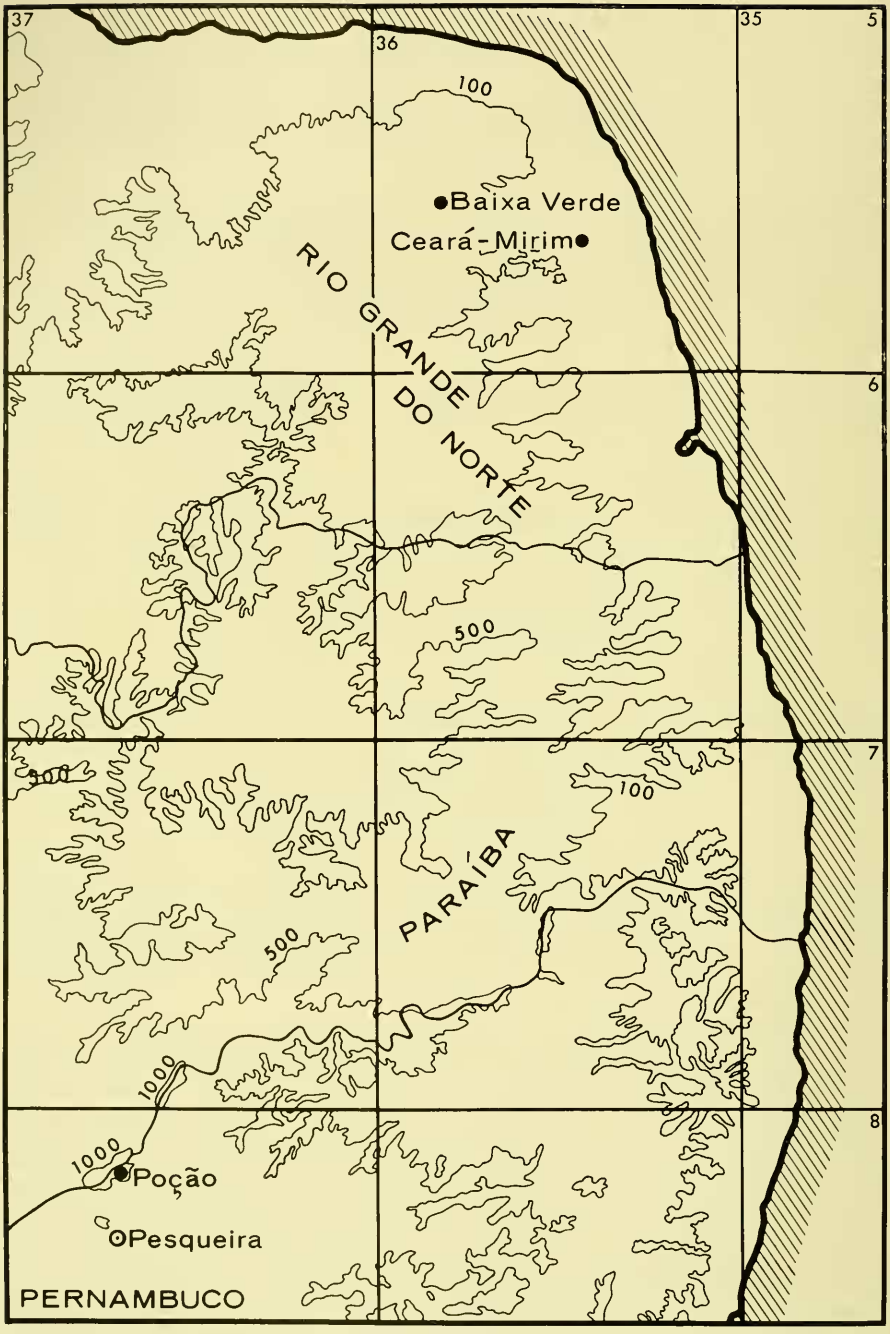

FIGURE 1. *Amphisbaena*. Sketch map of the extreme northeast of Brazil to show the localities mentioned in the text. The 100, 500, and 1000 meter lines have been shown on the map.

is clearly distinct, both from the large forms *A. alba*, *A. pretrei*, and *A. vermicularis*, all of which occur in the general vicinity, as well as from the peculiar, small, lowland species *A. heathi* described from Rio Grande do Norte by the late K. P. Schmidt on the basis of two specimens.

This paper describes the new species and also furnishes a standardized redescription and illustrations of *Amphisbaena heathi*. It is a pleasure to name the new form *Amphisbaena carvalhoi* after the collector, Sr. Antenor Leitão de Carvalho, in recognition of his contributions to our knowledge of the herpetofauna of northeastern Brazil and in gratitude for his assistance and hospitality. Dr. Alan E. Leviton of the California Academy of Sciences (C.A.S.), Drs. Antenor L. de Carvalho and Bertha Lutz of the Museu Nacional, Rio de Janeiro (M.N.) and Dr. George S. Myers of the Stanford University Systematic Collections (S.U.) made available specimens in their care. Mrs. Margaret McKinney sketched the animals and Miss Charlyn Rhodes furnished technical assistance. The description follows the standard form used in Gans and Alexander (1962). Figure 1 shows the localities mentioned in the text. The review of the amphisbaenia is supported by NSF G-21819.

Amphisbaena heathi Schmidt.

Amphisbaena heathi SCHMIDT, 1936, p. 29 (plate 3, fig. 1). Terra typica: "Baixa Verde, Rio Grande do Norte," Brazil. HOLOTYPE: CAS 49374. PARATYPE: CAS 49424 (Ceará Mirim, Rio Grande do Norte, Brazil).

DIAGNOSIS. A small form of *Amphisbaena* with a pointed, elongate, markedly flattened, very wide head, and somewhat prognathous snout, all circumscribed by smooth curves, and covered dorsally by very regular shields up to the nuchal region, with trapezoidal first parietals in point contact with each other; and with three supra- and three infralabials. The form has 183 to 187 body annuli; 7 to 8 caudal annuli up to the autotomy constriction (at which the tail is broken in both specimens); 12 dorsal and 18 to 20 ventral segments to a midbody annulus; and four well expressed, large, round precloacal pores in the male, none in the female. Only the lateral sulci, and these but faintly, are apparent. Neither dorsal nor ventral segments are wider than long. The color of preserved specimens is an even brown dorsally, the pigment covering the entire segmental surface and fading out laterally.

NOTES ON THE TYPES. Both specimens are externally in reasonable condition, with some slight soft spots.

DESCRIPTION. Figure 2 of the present paper shows views of the head, figure 3 the cloaca and (autotomized) tail, figures 4 through 6 inclusive photographs of the coloration and other aspects of specimens. Figure 7

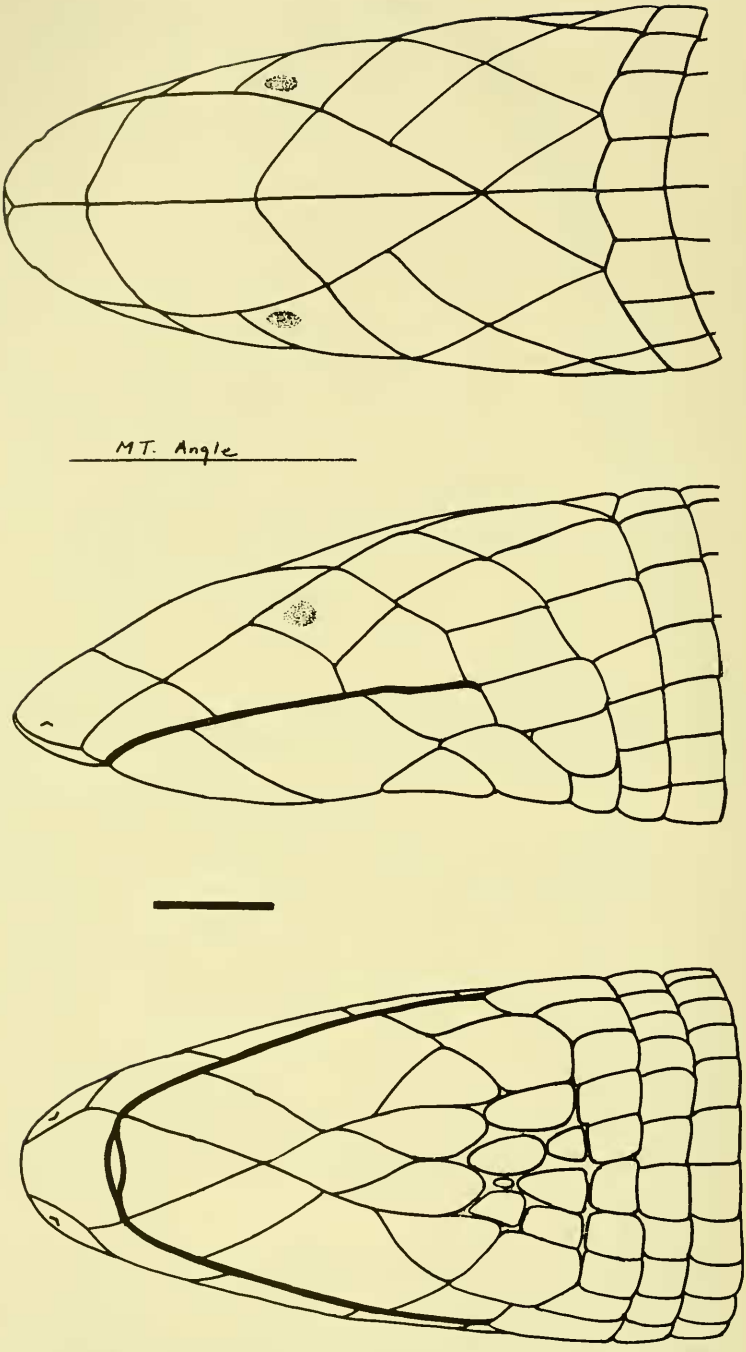

FIGURE 2. *Amphisbaena heathi*. Dorsal, lateral and ventral views of the head of the holotype, CAS 49374, from Baixa Verde, RGN, Brazil. The line equals 1 mm. to scale. (M. McKinney, del.)

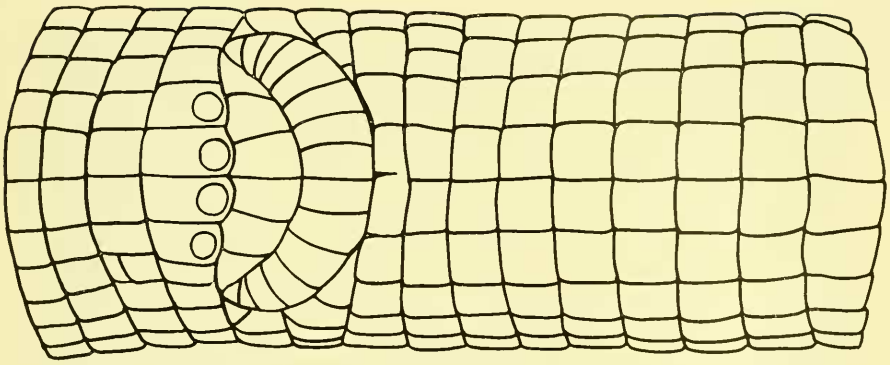

FIGURE 3. *Amphisbaena heathi*. Ventral view of cloaca and autotomized tail of CAS 49374. (M. McKinney, del.)

compares body proportions with those of *A. carvalhoi*. Meristic data are listed in table 1.

This is a small-sized species of *Amphisbaena* of a brownish dorsal color, without pattern, but with a slight dorsoventral countershading. The lightened color appears to extend anteriorly through the infralabial region. The entire surface of a dorsal segment is evenly pigmented. Countershading occurs by a gradual fading out along the sides with no trace of segmental drop-out in the (faded) specimens.

The head segmentation is characterized by lack of major fusions, by a pair of extremely large prefrontals, and by the fact that the large trapezoidal first parietals are only in point contact on the middorsal line. The head is of generally spatulate appearance, with the snout pointed, elongate, and markedly flattened. The wide head is circumscribed dorsally, laterally, and ventrally by smooth curves that run from the nuchal region to the rostral tip. The smooth transition is not interrupted dorsally by the faintly apparent temporal muscle bulges that provide a faint set off of the head from the trunk, but the chin is ventrally flattened and set off from the body.

The rostal is slightly larger than the third supralabial and only its very tip is visible from above. Pairs of nasals, very large prefrontals, frontals, and first and second parietals form a sequence of large shields along the dorsal surface of the head. The posterior edge of the frontals lies just caudad to the level of the angulus oris. The first parietals are large, trapezoidal and may or may not be in point contact with each other just posterior to the frontals' posterior tips. The second parietals form a pair of right triangles, the hypotenuse of which contacts the posteromedial edge of the first parietals. The lateral sutures of the prefrontals and frontals appear to be prolongated across the midline to form the lateral edge of the second parietals of the opposite

TABLE 1

Table of data for available specimens

Species and number	Sex	ANNULI Body+Lat+(Aut.)Tail	SEGMENTS Dors/Vent	Labials	Chin Segments	Cloacal Segments	Length
Amphisbaena heathi							
CAS 49424	♀	187+4+(7)x	12/18	3/3	2-3-6	0-8-11	115+x
CAS 49374	♂	183+3+(8)x	12/18-20	3/3	2-3-6	4-8-12	124+x
Amphisbaena carvalhoi							
MN 1759	–	234+4+(7)20	13-14/18	3+/3	2-3—	4-6-14	121+15
MN 2093	♂	235+5+(7)20	13-14/18	3+/3	3-3—	4-8-12	82+10
MN 2094	–	245+3+(7)20	12/17-18	3/3	2-0—	4-8-12	89+11
MN 2095	♂	231+4+(7)19	12/16	3+/3	2-3--	4-8-12	129+16
MN 2096	♀	237+3+(7)21	12-13/17-18	3/3	2-3—	4-8-12	121+15
MN 2097	–	236+4+(7)20	14/18	3+/3	2-3--	4-8-14	86+10
MN 2098	–	245+3+(7)20	14/18	3+/3	2-3--	4-8-12	85+11
SU 17289	–	236+4+(8)21	14/18	3/3	2-3--	4-8-13	112+14
SU 17290	–	244+4+(8)22	13-14/18	3/3	2-3--	4-8-13	94+11

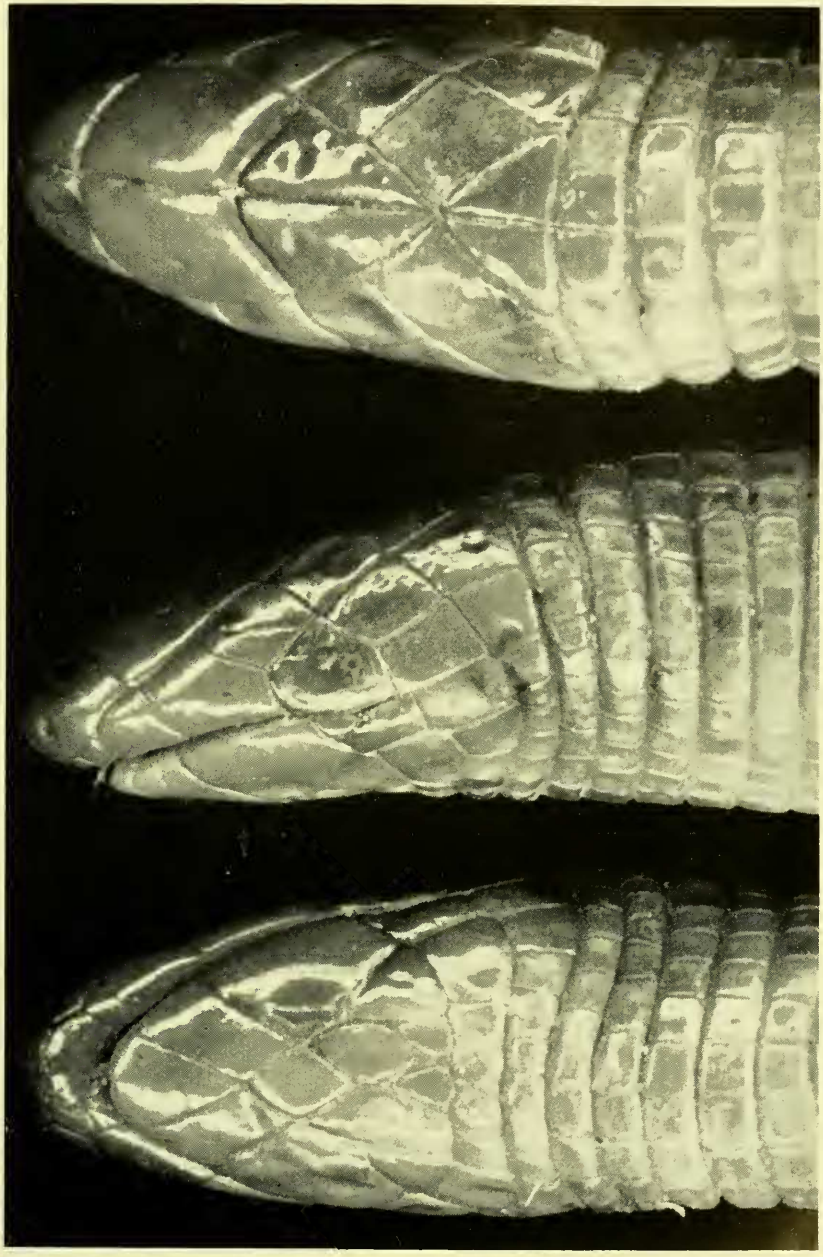

FIGURE 4. *Amphisbaena heathi*. Dorsal, lateral and ventral views of the head of the paratype, CAS 49424, from Ceará Mirim, RGN, Brazil.

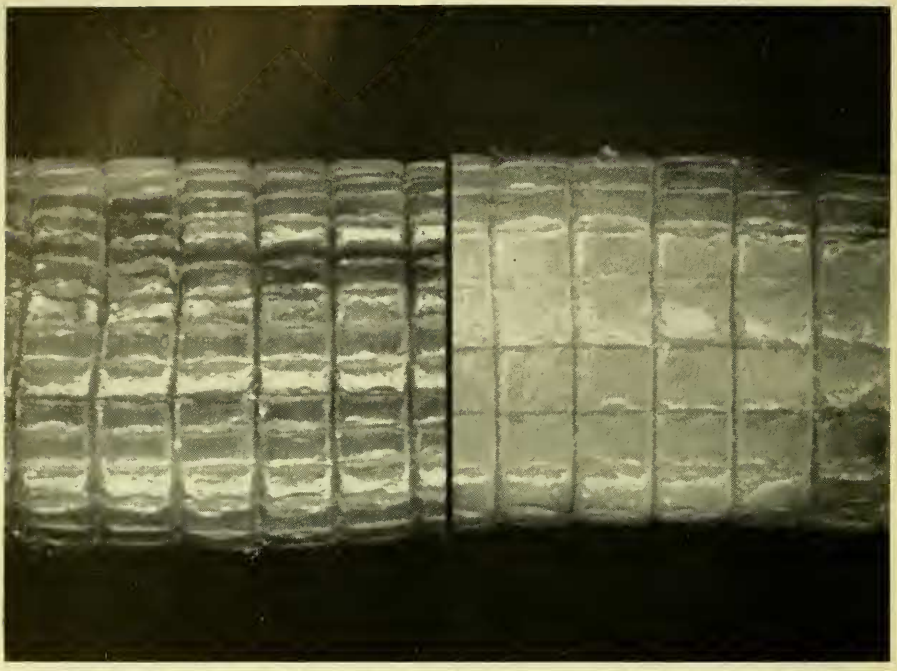

FIGURE 5. *Amphisbaena heathi*. Dorsal and ventral views at midbody of CAS 49424, to show segment proportions.

side. They are paralleled by the sutures between ocular and third infralabial, which continue in an unbroken straight line as the post-ocular-temporal sutures and as those between the first parietals and the segments ventral to them. All of this gives the scale pattern a very characteristic regular geometrical appearance. There are three subequal supralabials, the second the largest, the third occupying the shortest distance along the labial edge. The posterior edge of the third supralabial always lies slightly anterior to that of the third infralabial. The interlabial sutures run anteriorly at angles (to the labial edge) of 30°, 45°, 90°, and 90° respectively. The ocular is quadrilateral, in contact with the dorsal edges of the second and third supralabials, in broad contact with the prefrontals, in point contact with the frontal, and margined posteriorly by the equal-sized postocular.

The mental is elongate and triangular, and in point contact with the small rhomboidal postmental, the sides of which are approximately equal in width to the elongate trapezoidal first infralabials whose medial edges contact it. The second infralabials are huge and in point contact with the postmental. Two first large postgenials lie between the medial edges of the second infralabials, and the posterolateral edges of the postmental. These are followed by the three small second postgenials. The third infralabial is

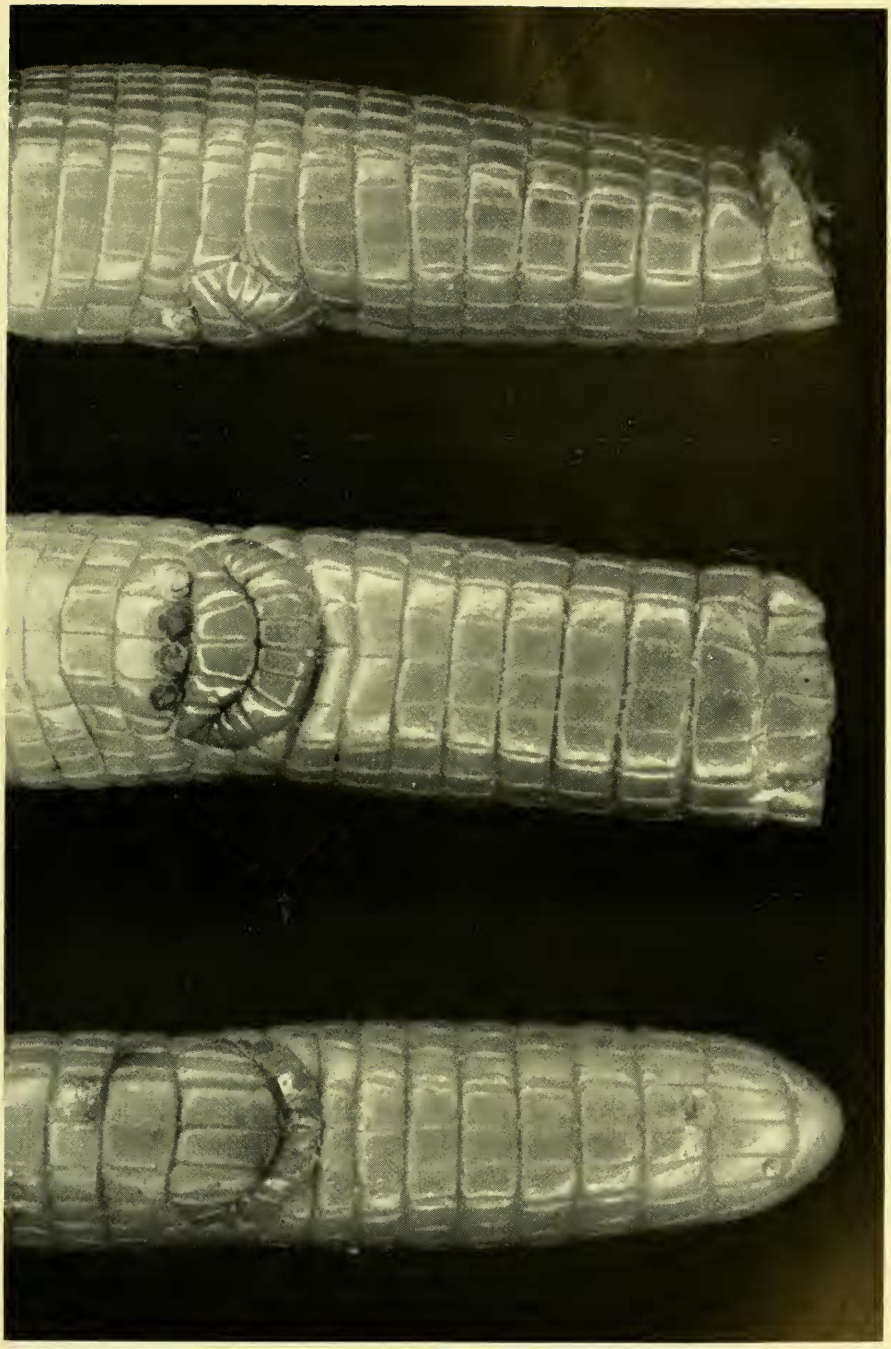

FIGURE 6. *Amphisbaena heathi*. Lateral (top), and ventral (middle) views of the cloaca and tail of the holotype, CAS 49374, and ventral view (bottom) of the tail of the paratype, CAS 49424, to show expression of the precloacal pores, and healing of the autotomized stump.

small. Medial to it lies a pair of large shields on each side, occupying the position normally held by the malars. Neither pair contacts the postmental. The posterior ones are here considered as the enlarged extreme lateral segments of the postmalar row, which then numbers six segments. Enlarged postsupralabials (postinfralabials) larger than the preceding segment(s) in line, lie caudad to the angulus oris.

Dorsally the first body annulus includes two large shields back of the first supralabial and the trapezoidal postocular. The second body annulus also sweeps forward to include two segments plus the enlarged first parietals. The second parietals represent a remnant of an intercalated dorsal half annulus. The anterior edge of the third body annulus sweeps slightly anterior and its middorsal elements are slightly lengthened. The midventral elements of the first through fourth annuli are somewhat narrower but otherwise regular. This narrowing accounts for the anterior curvature of the ventral portions of these and the four succeeding annuli. More posterior annuli show no anterior curvature and lie normal to the long axis of the trunk.

There are 183 to 187 body annuli from the back of the third infralabial, up to and including the precloacal "pore bearing" row. The pectoral region is very short and not complexed. There are neither intercalated dorsal half annuli nor irregularities along the trunk. Only the paratype has an irregularity in the immediate precloacal region. There are 12 dorsal and 18 to 20 ventral segments to a midbody annulus.

The cloacal region of the male is characterized by four large round precloacal pores which are completely lacking in the female. Both specimens are clearly adult and have mature gonads. The female has the oviduct filled with a poorly preserved yolk mass in an early stage of development. There are eight pre- and 11 to 12 postcloacal segments, with the two lateral precloacals very much the smallest, and three to four lateral half annuli. There are seven or eight caudal annuli up to and including the autotomy annulus after which the tail is freshly autotomized in the holotype and autotomized and healed in the paratype (which accounts for Schmidt's remarks).

The lateral sulci are faintly indicated by elaboration of the aligned intersegmental sutures after approximately the thirty-fifth body annulus and until the eighth precloacal annulus. Dorsal and ventral sulci are, if present, expressed only by alignment of intersegmental sutures.

The middorsal segments are approximately 1.5 times as long as wide and the midventral 1.2 to 1 as long as wide, so that there are no segments wider than long. There is relatively little change in segment proportions along the length of the trunk.

Range. Brazil. Rio Grande do Norte, lowland coastal region.

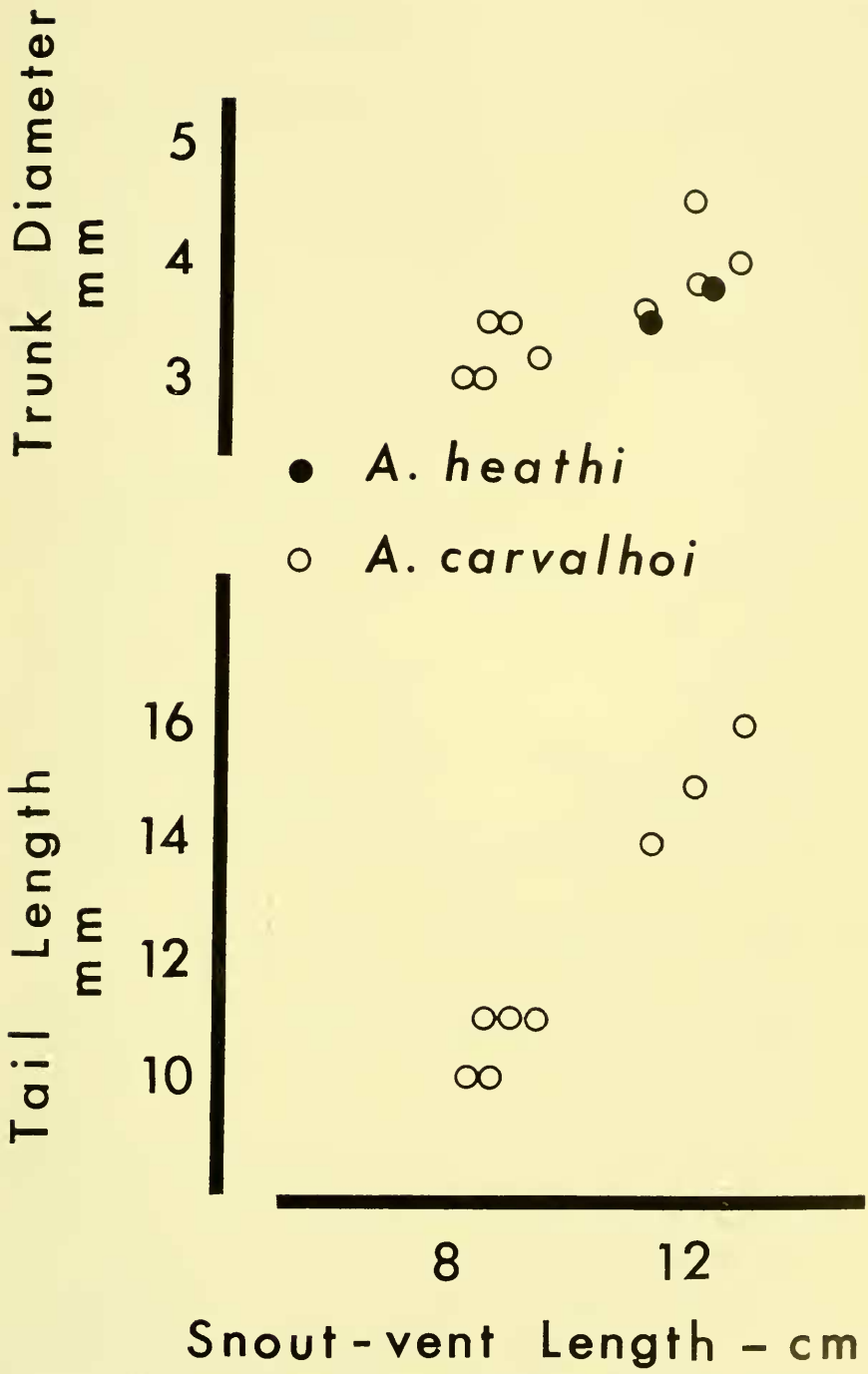

FIGURE 7. *Amphisbaena*. Scatter diagram of body diameter and of tail length, versus snout-vent length of specimens mentioned in the paper.

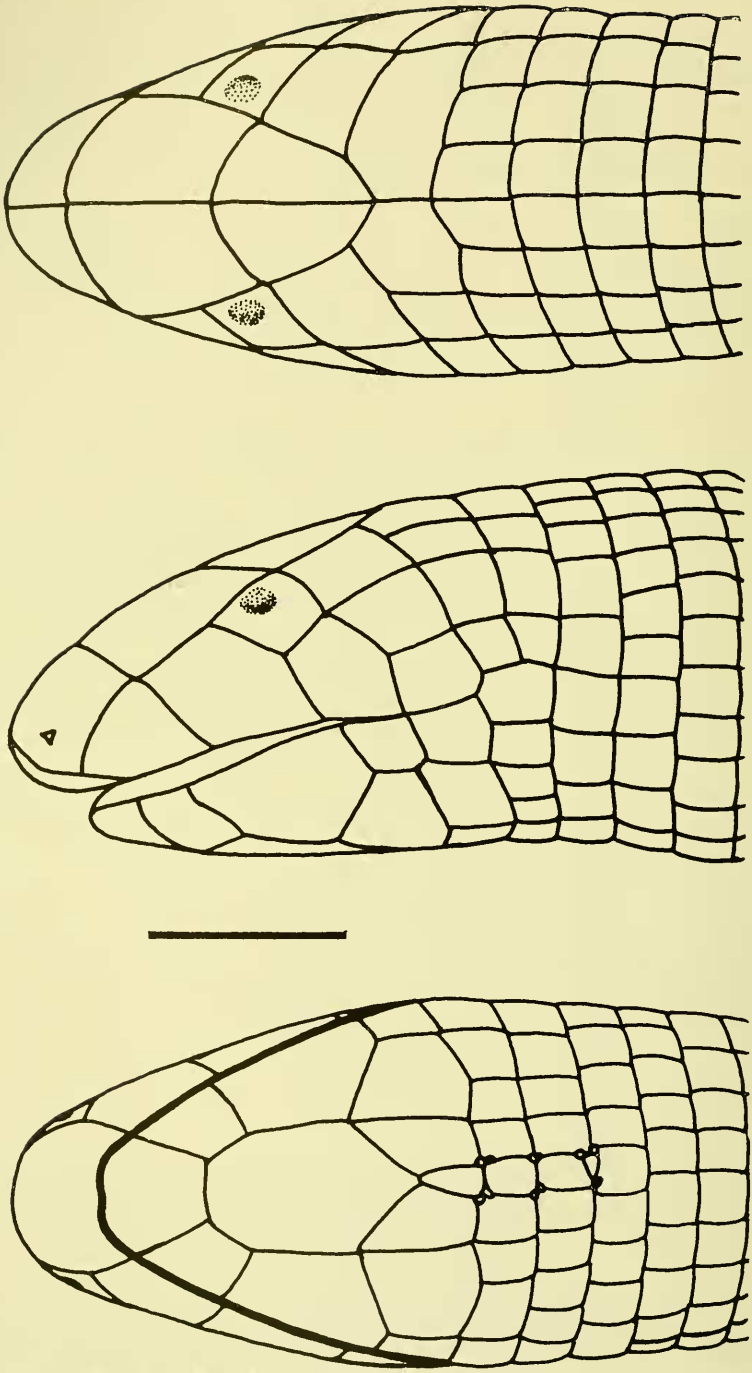

FIGURE 8. *Amphisbaena carvalhoi.* Dorsal, lateral and ventral views of the head of the paratype, MN R–2094, from Poção, Pernambuco, Brazil. The line equals 1 mm. to scale. (Mrs. M. McKinney, del.)

Distribution records. BRAZIL: Rio Grande do Norte: Ceará Mirim, CAS 49424 (paratype). Baixa Verde, CAS 49374 (holotype).

Amphisbaena carvalhoi Gans, new species.

Diagnosis. A very small form of *Amphisbaena* without major fusions of head shields, with slightly enlarged first parietals, with three supra- and three infralabials; and with two postgenial and no postmalar rows. The head is slightly compressed dorsoventrally, noticeably set off from the neck and bears a regular segmentation pattern. The form has 231 to 245 body annuli; 7 to 8 caudal annuli up to the autotomy constriction (all tails are complete); 19 to 22 caudal annuli from the cloaca to the conical caudal spine; 12 to 14 dorsal and 16 to 18, generally 18, ventral segments to a midbody annulus; and four clearly expressed, small, round precloacal pores in both sexes. The color of preserved specimens is brown dorsally, fading out ventrally on the trunk. The nape and parietal aspects of the head and the dorsal surface of the tail are slightly darker. The lightened area extends across the supralabials and the rostral region. Pigmentation consists of a general coloration of the dorsal segments, emphasized on the rectangular segmental centers. Laterally the margins fade, the rectangles decrease in size, and segmental drop out occurs.

Holotype. MN R2095, an adult male, collected by Antenor Leitão de Carvalho at Poção, Municipio de Pesqueira, Pernambuco, Brazil. Poção lies on the Serra de Acahy at 1035 m elevation, and the specimen was collected in broken up granite gravels near the top of the mountain range (cf. Carvalho, 1937).

Paratypes. MN R1759, R2093–R2094, R2096–R2098; SU 17289–17290 (taken with the holotype).

Description. Figure 8 of the present paper shows views of the head, figure 9 shows ventral and lateral views of the tail and figures 10 through

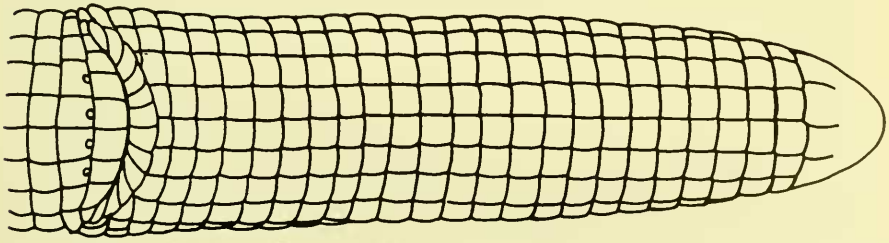

Figure 9. *Amphisbaena carvalhoi*. Ventral view of cloaca and tail of the paratype, MN R–2094, from Poção, Pernambuco, Brazil. The line equals 1 mm. to scale. (Mrs. M. McKinney, del.)

12 are photographs of the coloration and other aspects. Figure 7 compares body proportions with those of *Amphisbaena heathi*. Meristic data are listed in table 1.

This is a small-sized species of *Amphisbaena* with an even brown dorsal color, emphasized on the parietal region and on the dorsal surface of the tail. The ventral surface is light colored from the tip of the tail up to and including the infralabials, first (and second) supralabials and the rostral tip. Some specimens (including the holotype) show a fainter version of the dorsal color on the ventral surface of the tail. Pigmentation is uniform across many of the dorsal segments; others show a rectangular darkened area. The countershading is achieved by a gradual fading of the segmental margins, proceeding more rapidly below the lateral line, by a decrease of the area occupied by the central rectangle, and by marked segmental drop-outs.

Head segmentation is characterized by lack of major fusions, by large prefrontals, by postoculars almost as large as the frontals, and by medium-sized first and no enlarged second parietals. The head is relatively short, more or less pointed and dorso-ventrally compressed. The temporal muscles bulge noticeably and the middorsal sutures are faintly sunk from the level of the frontals to the third body annulus. The nuchal region is slightly constricted. After this the trunk continues at constant diameter along most of its length.

The rostral is approximately of the size of the first supralabial and only its tip is visible in dorsal view. Pairs of sizeable nasals, large prefrontals, small frontals, and medium-sized first parietals form a sequence of large shields along the dorsal surface of the head. The posterior edge of the frontals lies slightly anterior to the level of the angulus oris. There are three supralabials, the second the largest; the third the smallest. The posterior edge of the third supralabial generally lies slightly anterior to that of the third infralabial. The interlabial sutures run anteriorly at angles (to the labial edge) of 30°, 50°, 60°, and 75° respectively. The ocular is quadrilateral, in contact with part of the dorsal edges of the second and third supralabials, in broad contact with the prefrontal, in point contact with the frontal, and margined posteriorly by the postocular and possibly by the segment ventral to it.

The mental is a small, rectangular segment only slightly larger than the small first infralabials, and approximately one-half the size of the septagonal postmental. The second infralabials are very large and are medially in full contact with the postmental. The malars are large, and lie immediately posterior to the large second and medial to the small third infralabials. They never contact the postmental. Two subtriangular first postgenials enclose the posterior tip of the postmental and are followed

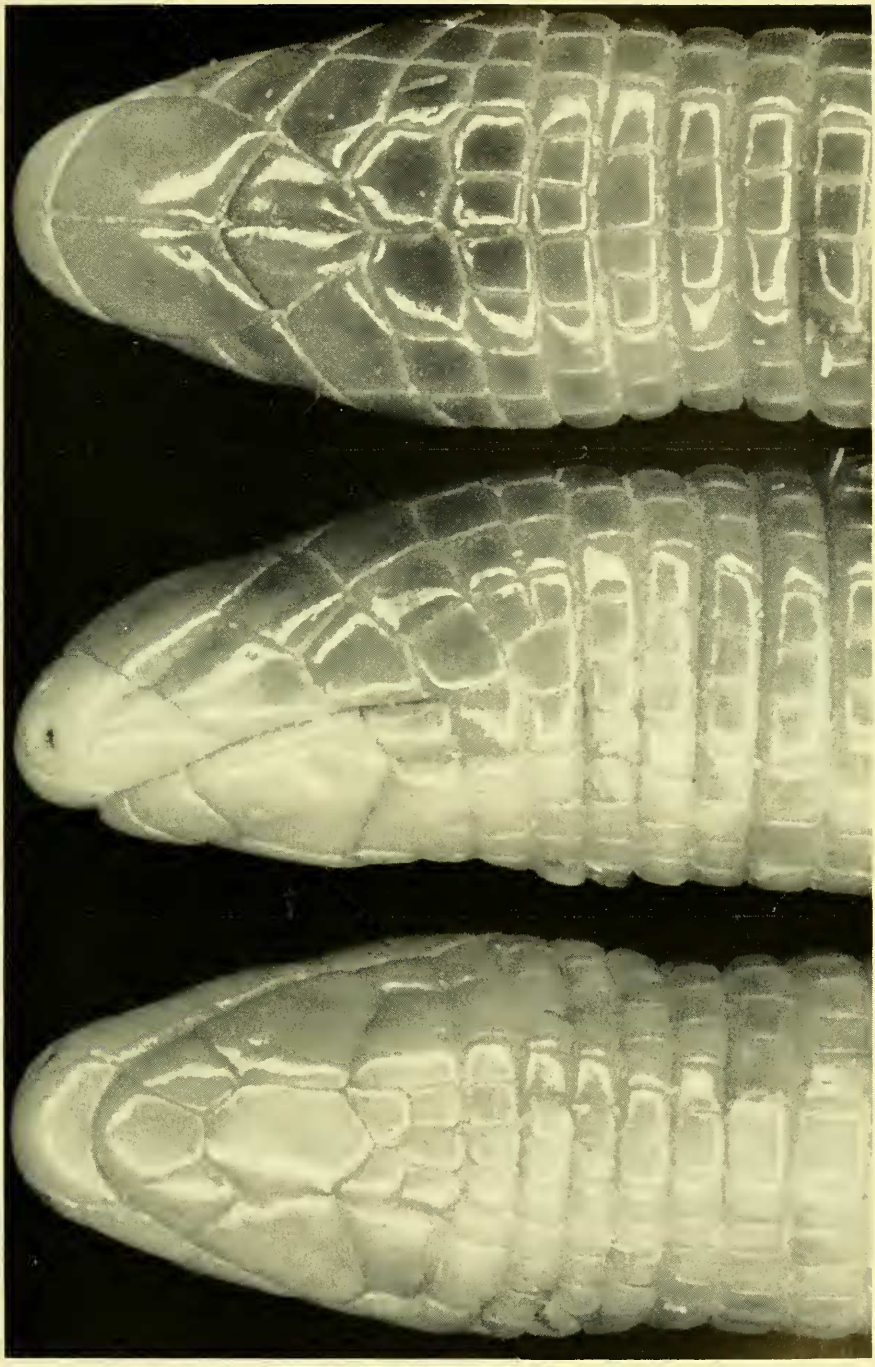

FIGURE 10. *Amphisbaena carvalhoi*. Dorsal, lateral and ventral views of the head of the holotype. MN R–2095.

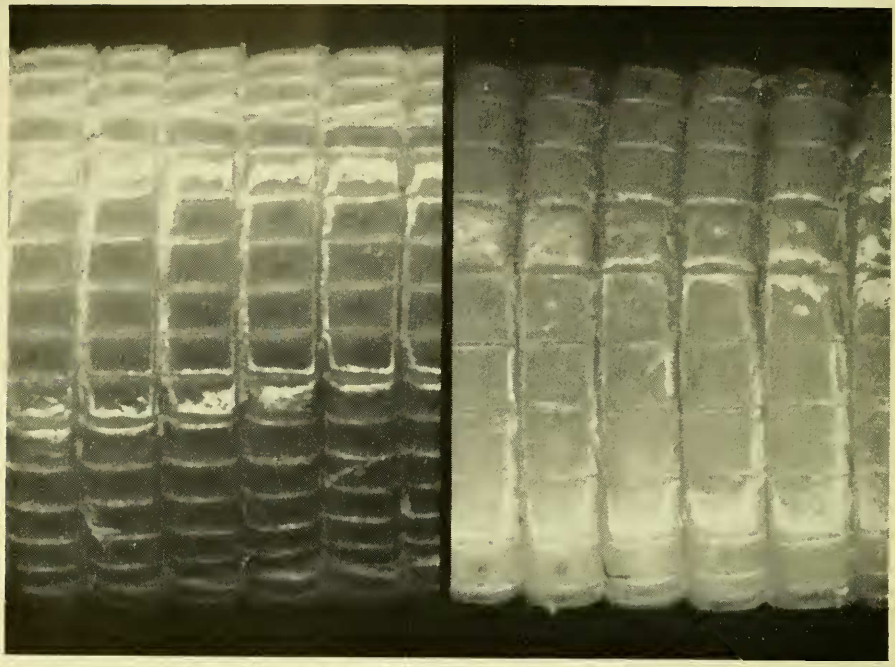

FIGURE 11. *Amphisbaena carvalhoi.* Dorsal and ventral views at midbody, of MN R–2095, to show segment proportions and pigmentation pattern.

by three postgenial segments of the second row. One specimen has a tiny median segment midway between the two large first postgenials. There are no postmalars. The lateralmost postmalar segments of the first body annulus are widened.There is always a pair of enlarged postsupralabials and postinfralabials.

Dorsally the first body annulus includes two large shields back of the third supralabial and the large postocular. The second body annulus generally splits one segment dorsal to the angulus oris, giving rise to two dorsal half annuli. The anterior of these is normally an intercalated one and the posterior one the dorsal continuation of the second body annulus, though irregularities occur and some specimens have two rather than one intercalated half annuli. The anterior dorsal half annulus includes two medium-sized, pentagonal first parietals as well as two to three smaller segments on each side. The posterior dorsal half annulus culminates in the second parietals which are scarcely enlarged. The midventral elements of the second through sixth body annuli are somewhat narrowed. The posterior annuli show no curvature and lie normal to the long axis of the trunk.

There are 231 to 245 body annuli from the back of the third infralabial up to and including the precloacal porebearing row. The pectoral region

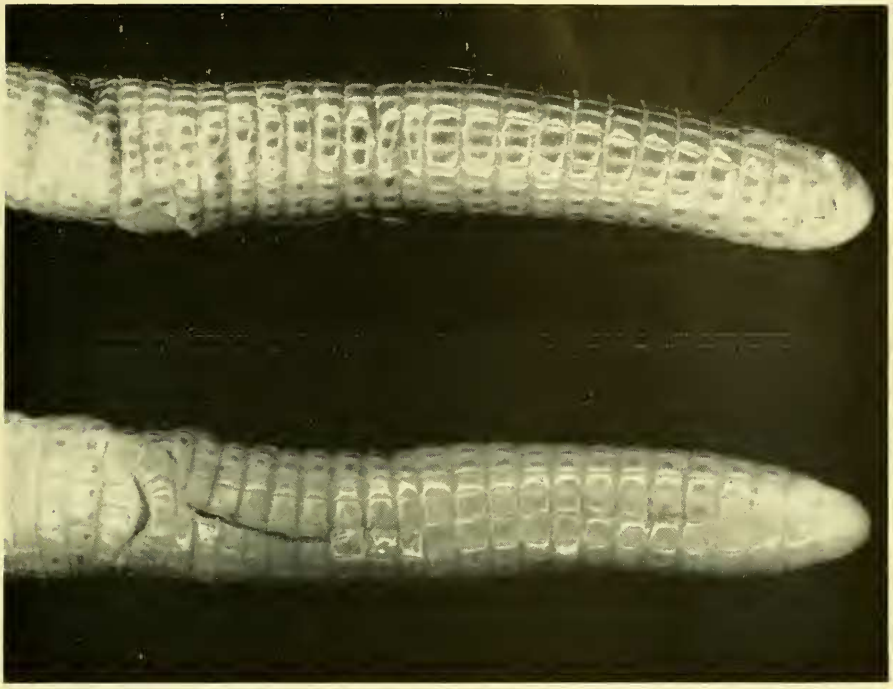

FIGURE 12. *Amphisbaena carvalhoi*. Lateral (top) and ventral (bottom) views of the cloacal region and tail of MN R–2095, to show proportions, segment and pore arrangement, and color pattern.

is not complexed. There are no irregularities or intercalated dorsal half-annuli along the trunk, though there generally is some irregularity in the ten precloacal annuli. There are 12 to 14 dorsal and 16 to 18, generally 18, ventral segments to a midbody annulus.

The cloacal region is characterized by four medium-sized, but clearly expressed, round precloacal pores, present in both sexes and in juveniles. Six larger precloacal segments cover a half-moon-shaped precloacal shield, that is extended laterally by a small straight segment on each side, so that there generally are eight precloacals. Twelve to 14 radially arranged postcloacal segments, with the two midventral ones slightly enlarged, border the posterior lip of the cloaca. Lateral half annuli number three to four. There are 7 to 8 caudal annuli up to and including the clearly narrowed and constricted autotomy annulus, and 19 to 22 from the cloaca up to and including the caudal tip. The tail swells slightly posterior to the autotomy constriction, and then becomes gradually conical, reducing down to the parabolic, vertically oval tip.

The lateral sulci are clearly indicated after the fiftieth body annulus

and run up to the level of the cloaca. At midbody they are expressed as grooves half as wide as one of the fringing segments and filled with broken segments. The dorsal sulcus is barely indicated by alignment of intersegmental sutures. It is clearly apparent only at the base of the tail and in the nuchal region. The ventral is indicated only by alignment of intersegmental sutures.

The middorsal segments are approximately 1.3 to 1.5 times as long as wide. The midventral segments vary from 0.9 to 1.2 times as wide as long. There is some minor variation in segmental proportions along the length of the trunk.

Range. Brazil. Pernambuco, Serra do Acahy.

Distribution records. BRAZIL: Pernambuco: Poção, Municipio de Pesqueira, elev. 1035 m., MN 1759, 2093–2094, 2095 (holotype), 2096–2098; SU 17289–17290.

LITERATURE CITED

Carvalho, Antenor Leitão de

1937. Notas oecologicas e zoogeographicas sôbre vertebrados do nordeste brasileiro. O Campo, pp. 12–14.

Gans, Carl

1963a. Notes on amphisbaenids (Amphisbaenia: Reptilia). 7. Redescription and redefinition of *Amphisbaena mitchelli* Proctor and *A. slevini* Schmidt from the middle and lower Amazon, Brazil. American Museum Novitates, no. 2127, 22 pp.

1963b. Notes on amphisbaenids (Amphisbaenia: Reptilia). 8. A redescription of *Amphisbaena stejnegeri* and description of a new species of *Amphisbaena* from British Guiana. American Museum Novitates, no. 2128, 18 pp.

Gans, Carl and A. Allan Alexander

1962. Studies on amphisbaenids (Amphisbaenia: Reptilia). 2. On the amphisbaenids of the Antilles. Bulletin of the Museum of Comparative Zoology, vol. 128, no. 3, pp. 65–158.

Klappenbach, Miguel A.

1960. Notas herpetologicas, I. *Amphisbaena muñoai* n. sp. (Amphisbaenidae). Communicationes Zoologicas del Museu do Historia Natural, Montevideo, vol. 4, no. 84, pp. 1–12.

Schmidt, Karl Patterson

1936. Notes on Brazilian Amphisbaenians. Herpetologica, vol. 1, pp. 28–32.